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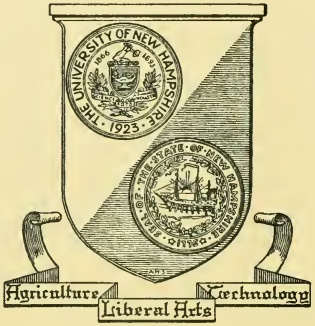

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Marketing

New Hampshire Hatching Eggs

BY

L. A. Dougherty

T. B. Charles

AND

A. M. Atwood

UNIVERSITY OF NEW HAMPSHIRE
AGRICULTURAL EXPERIMENT STATION
DURHAM, N. H.

Foreword

This study is part of a regional project in which a number of state experiment stations and the Production and Marketing Administration cooperated. The Delaware, Maine, Maryland, and Massachusetts Experiment Stations each worked on local phases of their hatching egg problem and will publish their findings. The New Hampshire Experiment Station and the Poultry Branch of the Production and Marketing Administration co-operated in planning and carrying out experimental shipments of hatching eggs and in collecting data. The project was financed in part by funds made available under the Research and Marketing Act of 1946.

Marketing New Hampshire Hatching Eggs

L. A. DOUGHERTY, T. B. CHARLES, and A. M. ATWOOD*

Importance of the Hatching Egg Industry

THE POULTRY INDUSTRY has the largest gross revenue of any agricultural enterprise in New Hampshire. Income from poultry and poultry products was reported as $27,891,000 in 1949. 44 per cent of the total gross farm income. The production of hatching eggs and sale as hatching eggs or chicks is the backbone of the industry. Few, if any, states sell a larger proportion of their total eggs as hatching eggs and chicks. The development of the New Hampshire breed and its aggressive promotion by able leaders in the industry have played a big part in the fortunes of a large majority of the poultrymen in the state.

Because the hatching industry is such an important part of New Hampshire agriculture, a study of the industry seemed desirable. The principal objectives of this study were:

1. To bring together information on the hatching-egg industry in New Hampshire and to include data on size of industry, breeds of chicks produced, sales outlets, methods of disposal, transportation, prices, and premiums paid for eggs.
2. Experimental shipments of eggs to determine where and how breakage occurred, changes in hatchability, extent of losses, and methods of preventing losses.

Data on the first objective were obtained through questionnaires sent to hatching-egg producers and by visits to farms. Data for the second group of objectives were obtained through experimental shipments of eggs into the broiler areas.†

Poultry Breeds in New Hampshire

THE NEW HAMPSHIRE breed, in numbers, exceeds by far all other breeds kept in the state. In the first place, a brown-egg breed is desired because brown eggs have always sold more readily over a period of years and have brought a premium on the Boston and northern New England markets.

But the principal reasons for the popularity of New Hampshires have been their ability to give high production of large eggs and the fact that they make excellent broilers either as straight New Hampshires or as cross breeds.

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*Mr. Dougherty is Assistant Agricultural Economist; Mr. Charles, since resigned, was Poultry Husbandman; and Mr. Atwood, since resigned, was Research Assistant in Marketing.

†The Poultry Branch of the Production and Marketing Administration (U.S.D.A.) cooperated with the New Hampshire Agricultural Experiment Station in this study, particularly as it related to transportation of hatching eggs which involved candling and checking eggs in Florida, Maryland, and New Hampshire. It also obtained railway express data on shipping losses. E. H. Rinear, Marketing Research Analyst, was the P.M.A. representative and his report is made in *Problems of Transporting and Marketing Hatching Eggs and Baby Chicks in the Northeastern States.* (See foreward).

Breeds reported for the state among supply flocks in the National Poultry Improvement Plan, based on a total of 1,249,485 reported, are as follows:

New Hampshires	83.9%
Barred Rocks	12.1%
Rhode Island Reds	2.0%
White Rocks	1.5%
White Leghorns	.5%

A somewhat bigger percentage (87.9 percent) of New Hampshires is indicated in the reports on birds bloodtested for pullorum. These data are shown in Table. 1.

Table 1. Breed Distribution in New Hampshire
(Based on 1,352,165 birds blood tested in 1948-1949)

Breed	No. of Birds Tested	% of Total Tested
New Hampshires	1,188,115	87.87
Barred Plymouth Rocks	134,135	8.92
Rhode Island Reds	14,831	1.10
White Leghorns	7,122	.53
White Rocks	6,749	.50
Other breeds	839	.06
White Wyandottes	374	.03
	1,352,165	100.

Pullorum-Testing Program in New Hampshire

New Hampshire has been one of the leaders among the states in the emphasis placed on pullorum-clean flocks. This has been an important factor in the demand for New Hampshire stock. Data outlining this progress are shown in Table 2.

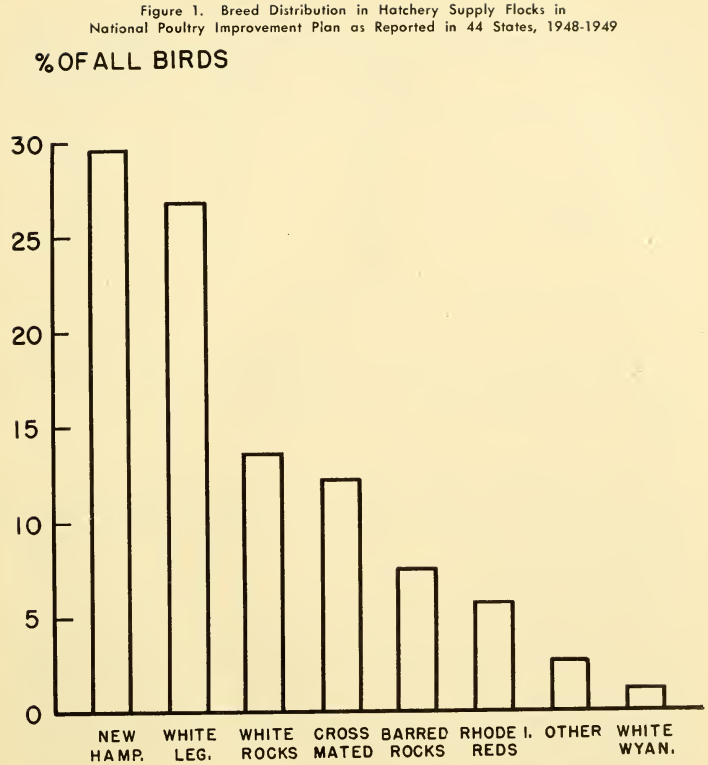
Table 2. Progress of Pullorum-Testing in New Hampshire

Date	Flocks Tested	Birds Tested	% of Infected Flocks	% of Infected Birds
1925-26	123	35,237	34.	2.5
1930-31	190	171,366	18.	.94
1935-36	281	370,176	10.	.18
1940-41	532	804,953	2.2	.02
1945-46	869	1,395,993	4.02	.03
1950-51	656	1,601,000	.61	.004
1951-52	584	1,783,114	.86	.014

Rapid Gain in Popularity for New Hampshires

While New Hampshires have been growing in popularity over a period of years, the increase of the breed in the last five years has been phenomenal, especially when it is considered that large numbers of birds are involved. Based on reports covering the hatchery supply flocks in the National Poultry Improvement Plan, the number has doubled in five years. These data are shown in Table 3.

Figure 1. Breed Distribution in Hatchery Supply Flocks in National Poultry Improvement Plan as Reported in 44 States, 1948-1949



Individual states showed much larger percentage increases in a six- or seven-year period, for example: Michigan (over 3 times), Texas (over 6 times), Indiana (over 10 times), and Arkansas (60 times).

In the 1948-49 report on birds included in the National Poultry Improvement Plan, New Hampshires were well in the lead in the United States (44 states) with 29.6% of all birds enrolled as against 26.9% for White Leghorns. (See Figure 1.)

Hatching-Egg Outlets for New Hampshire

The largest market for New Hampshire hatching eggs is in the Middle Atlantic states. The Delaware-Maryland-Virginia broiler area, often termed the Del-Mar-Va area, buys a large volume of eggs. But New Hampshire hatcheries also take a large quantity.

Chick hatchings in New Hampshire, as a percentage of total eggs produced, is larger than for any New England state. These data are shown in Table 6.

Table 3. Change in Breed Popularity in United States.
Based on reports on Hatchery Supply: Flocks in National Poultry Improvement Plan; 5-year period, 1943-44 to 1948-1949; matched samples — 40 states).

Breed	1943-44 (% all birds)	1948-49 (% all birds)	Change in 5 years (Percent)
New Hampshires	13.6	29.3	+115.4
White Leghorns	27.5	24.8	— 9.8
White Rocks	20.5	14.7	— 28.3
Barred Rocks	14.1	7.6	— 46.1
Cross-mated	7.7	13.3	+ 72.7
Rhode Island Reds	8.6	5.9	— 31.4
White Wyandottes	2.9	1.6	— 44.8
Other	5.1	2.8	— 45.1
	100.	100.	

Data: Bureau of Animal Industry, U.S.D.A., December 1949

Hatching-eggs sales made up about two-thirds of the total sales, according to reports from 63 producers, with average sales of over 1,300 cases weekly in 1947. Hatching eggs made up about the same percentage of all sales in each season in the year. (See Table 4.)

Uses of New Hampshire Hatching Eggs

The two principal outlets for New Hampshire hatching eggs are for broiler production and flock replacements. The outlet for broiler production is the larger of the two and the largest purchasing area is in the Delaware-Maryland-Virginia secion.

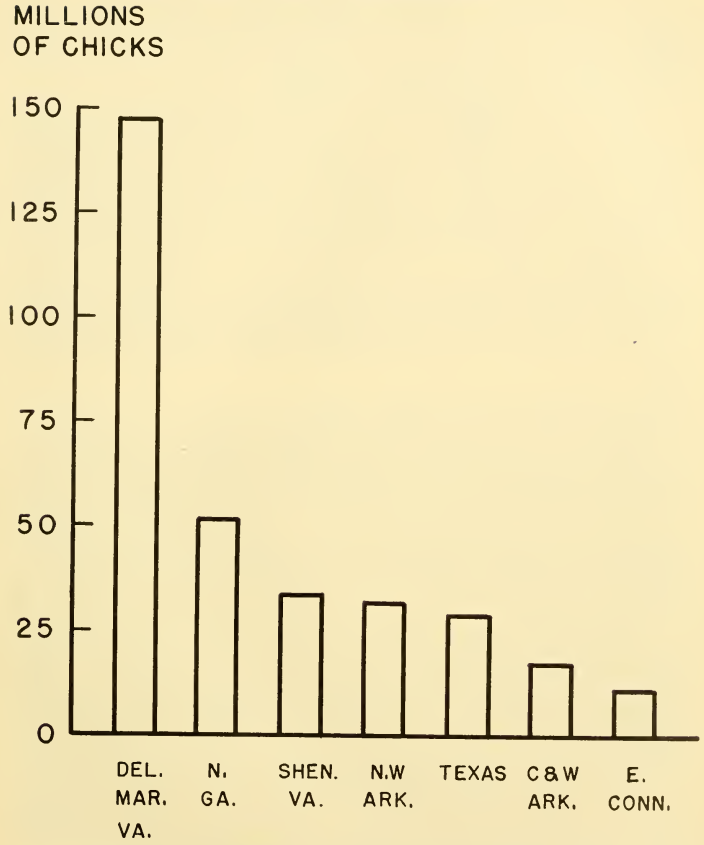
The New Hampshire hatching-egg industry has been heavily dependent upon broiler production.

New Hampshire was one of the early leaders in winter broiler production. Some of these first winter broilers brought over $1.00 per pound in the New York market. While broiler production has increased in New Hampshire in the past few years — from 850,000 in 1939 to 3,321,000 in 1948, the big commercial areas, such as in Delaware, Maryland, and Virginia, account for much of the demand. New areas, such as those in Georgia and Texas, also take many eggs.

Table 4. Sales of Hatching and Market Eggs
(Weekly sales in cases by 63 hatching-egg producers in 1947.)

	Spring (Percent)	Summer (Percent)	Fall (Percent)	Winter (Percent)	Total (Percent)
A. Comparative Sales of Market Eggs and Hatching Eggs by Seasons					
Market Eggs	31.6	36.8	35.3	33.7	34.4
Hatching Eggs	68.4	63.2	64.7	66.3	65.6
All Eggs	100.	100.	100.	100.	100.
B. Percentage of Market Eggs and Hatching Eggs Sold Each Season					
Market Eggs	20.	22.6	29.9	27.5	100.
Hatching Eggs	22.6	20.3	28.8	28.4	100.
All Eggs	21.7	21.1	29.2	28.1	100.
C. Average Weekly Sales of Market and Hatching Eggs					(For the year)
	(Cases)	(Cases)	(Cases)	(Cases)	(Cases)
Market Eggs	6.9	7.8	10.3	9.5	8.6
Hatching Eggs	14.8	13.3	19.0	18.6	16.4
All Eggs	21.7	21.	29.2	28.1	25.

Figure 2. Chicks Placed in Commercial Broiler Areas, 1949



In Figure 2, the number of broiler chicks placed in the principal broiler areas is shown. New Hampshire plays an important part in supplying both chicks and eggs for hatching in these areas.

The demand for flock replacements is widespread. Hatcheries in New England take large quantities, but they are shipped also all over the United States and into foreign countries.

Reports from 69 producers, with total sales averaging 1,039 cases of hatching eggs weekly, indicated volume of sales as follows:

Barred Crosses	52.9%
New Hampshires	39.6%
Sex Linked Crosses	2.5%
Barred Plymouth Rocks	5.0%

A Maryland report* shows 90.1 percent of the chicks hatched as crossbreeds and 6.6 percent as New Hampshires, while in a Maine study† it was reported (December 1946 to November 1947) that 49.5 percent of the hatching eggs sold were crosses, 34 percent New Hampshires, 12.1 percent sex-linked, and 4.4 percent Rhode Island Reds.

More than 70 producers who were selling about 1,000 cases per week reported that approximately 74 percent of the hatching eggs went for broiler production and 26 percent for replacement purposes. Of the producers reporting, 47 percent sold all their hatching eggs for broiler purposes; 3 percent sold all their eggs for replacement purposes; 25 percent sold over half, but not all, for broiler purposes; 14 percent sold about half for broilers and half for replacement; and 11 percent sold over half, but not all, for flock replacements.

Hatching eggs are sent from New Hampshire to all parts of the United States. The volume which went into different areas in 1947 was reported as follows: 10 percent to New England; 52 percent to the Middle Atlantic states; 31 percent to the Southern states; and 7 percent to the Western states.

Disposal of Eggs by Hatching-Egg Producers

Data on disposal of hatching eggs were obtained from 69 hatching egg producers who handle about 1,400 cases per week. Approximately one-third of these used part of their eggs in their own hatchery operations. In the disposal of hatching eggs, sales direct to hatcheries ranked first; those used in their own hatcheries were second; and sale to buyers at the farm came third. These data are summarized as follows: sale of eggs direct to hatcheries, 41 percent; eggs used in own hatcheries, 30 percent; eggs sold to buyers at farm, 19 percent; those sold as market eggs, 9 percent; and other sales, 1 percent.

New Hampshire hatching egg producers rely to a large extent upon their own eggs for flock replacements and buy only about 15 percent outside the state. Commercial hatcheries in the state were reported as hatching 31,441,000 chicks in 1949, providing an important outlet for hatching eggs. Six New Hampshire hatcheries had a combined egg capacity of over 3,000,000 eggs in 1947. Reports on the capacity of 38 hatcheries are shown in Table 5.

No other New England state hatches as large a number of chicks as related to eggs produced. Chicks hatched totalled 8.17 percent of all eggs produced, a rate more than double that of Massachusetts and more than three

Table 5. Egg Capacity of 38 New Hampshire Hatcheries in 1947

	No. Included	Egg Capacity Included	Production in 1947 Reported as a % of Egg Capacity
Under 10,000 eggs	12	50,050	156
10,000 — 25,000 eggs	11	181,080	237
25,000 — 100,000 eggs	9	419,000	213
Over 100,000 eggs	6	3,028,000	518
	38	3,678,130	

*Maryland Misc. Publication 71, March 1949, *Marketing Hatching Eggs and Broiler Chicks in Delaware and Eastern Shore of Maryland* by H. D. Smith, P. R. Poffenberger, and S. H. DeVault.

†Maine Misc. Publication 617, *Marketing of Hatching Eggs in Maine* by Andrew Watson.

Table 6. Chicks Hatched as a Percentage of All Eggs Produced in New England States in 1949

State	Eggs Produced in 1949	Chicks Hatched in 1949	Chicks Hatched As a Percent of Eggs Produced
New Hampshire	387	31,441,000	8.2
Connecticut	511	33,749,000	6.6
Rhode Island	89	3,352,000	3.8
Massachusetts	829	31,024,000	3.7
Maine	425	10,983,000	2.6
Vermont	166	1,679,000	1.

times that of Maine. (See Table 6.) New Hampshire also hatches eggs from other states, but the figure indicates the importance of New Hampshire hatcheries as an outlet for hatching eggs.

Reports from 23 hatcheries in 1947 on sales of almost 16,000,000 chicks indicated that about two-thirds of the chicks were going to the northeast and eastern seaboard. (See Table 7.)

Selling Procedures

Hatching egg producers reported in 1947 that they sold the largest percentage of their eggs as hatching eggs in the spring (68 percent) and the smallest in the summer (63 percent). But they sold more hatching eggs in the fall and winter than they did in the spring and summer. Total production is highest in the winter months and lowest in summer. Those data are shown in Table 4.

Brokers who operate their own trucks usually pay for eggs as they pick them up. Usually those which are shipped are paid for at certain specified intervals, such as weekly or semi-monthly. Some go C.O.D. where the credit of the purchaser is not well established.

Some large shippers found it necessary to place or hire sales and credit agents in the Del-Mar-Va area to look after their interests as they could not check them close enough from New Hampshire. Some complaints were made on the high cost of this service, but it seemed to be necessary.

Premiums on hatching eggs are usually based on Boston wholesale market prices. Reports from 76 producers, in our survey covering 1947, indicated average premiums as follows: low — 16.4 cents, high — 27.2 cents, and average — 20.6 cents per dozen above the Boston wholesale price. Premiums of individual producers ranged from an average of 10 to 60 cents per dozen.

A few large hatcheries pay premiums based on the hatchability of the eggs. This is sound in that it encourages and rewards those who are maintaining higher hatchability. It does mean extra bookkeeping. They say that the producer with higher hatchability will be held longer and so will benefit in selling a bigger percent of his eggs. The hatchery must have the con-

Table 7. Destination of chicks sold by 23 New Hampshire Hatcheries in 1947

New England	31.3%
Middle Atlantic States	35.9%
Southern States	21.0%
Eastern Central States	8.3%
Western Central States	3.2%
Other	.3%

A Sample Premium Scale for a Large Hatchery

Premium Scale — Shipments on Wednesday, December 1, 1948 (or deliveries of Thursday, December 2) and until further notice.

Premium for 75% hatch — 30c — Sex-Linked Cross (SLXX)

25c — Heavy White Cross (HWXX) White Rocks (WR) New Hampshires (NH) White Leghorns (WL)

20c — Barred Cross (BXX), Barred Rocks (BR) Rhode Island Reds (RIR)

To illustrate at selected hatch levels —

90	37	32½	27½
85	35	30	25
80	32½	27½	22½
75	30	25	20
70	27½	22½	17½
65	25	20	15
60	22½	17½	12½
55	20	15	10

Note — *Advance payments will normally be made at the 70% hatch level.*

fidence of its producers if the system is to be successful. However, some hatcheries consider it too much work.

In this area, premiums usually refer to a given number of cents per dozen over the Boston wholesale market. The premium in the case illustrated here is based on a 75 percent hatch, with a sliding scale for higher or lower hatchability.

Twenty New Hampshire producers who made about 500 shipments of eggs in 1948 had hatchability ranging from 64.6 percent to 82.4 percent and averaging 73.8 percent. If a premium had been paid on hatchability over 75 percent as shown above, additional returns would have been received on 43 percent of the lots shipped.

Shipment of Hatching Eggs

Types of Egg Cases Used

The types and condition of egg cases used are of interest in that they have a bearing on both breakage and costs.

In Table 8, only those producers have been included who reported kinds of egg cases used and the average number of cases shipped weekly so as to weight the average figures. Data cover 67 shippers making average total weekly shipments of over 1,000 cases of hatching eggs.

Table 8. Types of Egg Cases Used in New Hampshire

Type of case used	% using*	% of the Total Cases Shipped†
Heavy wooden returnables	31	21
New commercial wooden	9	10
Secondhand commercial wooden	54	21
New fiber	22	11
Secondhand fiber	63	37

*Many producers were shipping in one or more kinds of cases.

†Weighted average.

Figure 3 (a). Thin wooden cases, the study showed, often cause trouble because the covers may split and give way.

More paper cases are being used for shipment of hatching eggs than formerly. Some believe them to be cheaper and that eggs arrive in better condition. Heavy-duty paper cases have given good results. Several shippers have reported less breakage than in the heavy returnable cases. Test shipments in new paper cases came through well.

Cases of one type stacked better for shipment and arrived with less damage than mixed types, such as paper and heavy returnables. Light wooden cases often give trouble because of use of coverings, previously nailed and split, which may break away.

Shippers used entirely too many cases that were not in first-class condition. Transportation agencies could well afford to be more rigid in their acceptance of cases for shipment.

All cases should be rigidly checked before each shipment. One shipper found that 25-33 percent of his heavy returnable cases had to be repaired for each trip. Another shipper replaced about 14 percent of his paper cases each trip. Flats and fillers must also be in good condition. Careful checking is important.

Rough handling is the principal cause of damage to cases. Wooden cases are cracked by rough handling and the nails work out. Sides become split and broken. Paper cases, when loaded next to such wooden cases, may be torn.

Paper cases must be kept dry. Wet cases tear easily. Heavy losses result when moisture-softened cases break open.

Methods of Shipment

Methods of shipment of hatchery eggs were reported as follows by 63 producers shipping a total of more than 1,000 cases per week.

Rail shipments	31.9%
Truck	67.8%
Plane	.3%

Some hatching eggs have been moved by plane over a period of years. The high cost, the inconvenience of delivery to and from the loading and receiving points, and the uncertainties of weather are factors which have held shipments to a low figure. Many producers would be interested in making more plane shipments, if rates were more attractive.

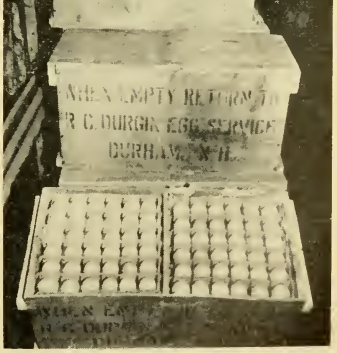


Figure 3 (b). Heavy wooden returnable cases were used by 31 percent of the producers surveyed.

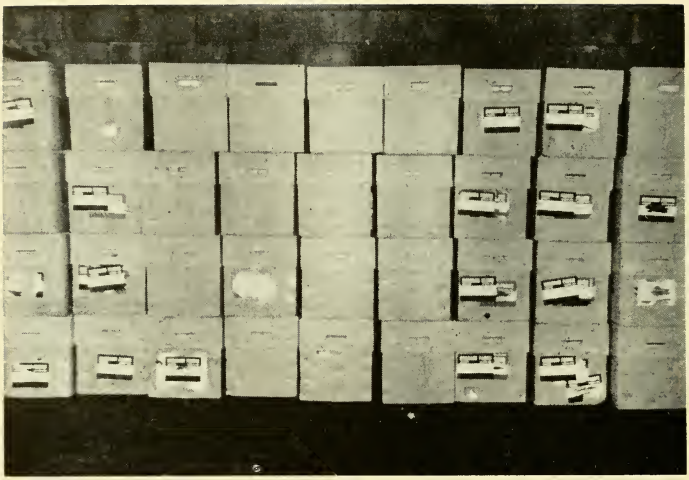


Figure 3 (c). Heavy duty paper cases have given good results, and more paper cases are being used than formerly.

Trucking of hatching eggs has increased greatly and rail transportation has decreased. Producers like truck service. Pickups are made at the farm by trucks, while in many cases no such service is offered for rail shipments. Many producers or handlers ship by truck where good service is available, such as to Maryland, but many of the Florida and Texas shipments go by rail.

Transportation of hatching eggs by truck has become a specialized business for several operators in New Hampshire. Some of them act as brokers or agents, and others operate strictly a trucking business. Some hatcheries operate their own trucks, picking up and hauling all their own eggs. Most hatcheries, however, rely on the truck operators to transport their eggs for them and manyare hauled on contract.

The type of truck depends upon the size of the operator and number of cases handled. The large operators use several types of standard trucks with van-type bodies in which they pick up the eggs at the farm and transport them to a terminal where they are reloaded on large tractor-trailers for trucking to the hatcheries. These trailers have an average capacity of 500 cases, and the same truck is used for two trips weekly to the Delaware-Maryland-Virginia area. Some go as far as Georgia.

Smaller trucking operators use the van-type truck for both pickup and delivery. Average capacity of these trucks is 150-200 cases.

Trucks are found practicable for pickup service in all but the least concentrated areas. Northwestern and northern sections of New Hampshire must rely mostly on rail service for delivery of their eggs to the truckers, who in turn truck them to the hatchery. Some producers, of course, ship direct to hatcheries by rail.

Some of our New Hampshire truckers serve other states as well. Vermont, Maine, and Massachusetts are at least partly covered by several of these operators.

Shipping Rates

Shipping rates have advanced a great deal in the last few years. This is indicated by the following rail rates from Durham, N. H., to Salisbury, Md., on different dates:

(Rail rates per 100 lbs. for hatching egs)

1938*	Dec. 13, 1946	Jan. 22, 1948	Feb. 14, 1949	Aug. 14, 1950
$1.55*	$1.91*	$3.96*	$4.01*	$4.40

Rail rates per 100 pounds for hatching eggs from Durham, N. H., to southern points were as follows, as of August 14, 1950:

Florida		Georgia	Maryland
Miami	Jacksonville	Gainsville	Salisbury
$5.98	$5.05	$5.18	$4.40

The rail rate from Durham, N. H., to Salisbury, Md., was $2.66 per case as of August 14, 1950.

Most of the eastern states along the seacoast as far south as Georgia are served by truck. Only one operator is known to go into Pennsylvania and only one goes as far south as Georgia.

Trucking charges are mostly standardized due to competition and state and federal regulations. One large trucker charged 30 cents per case, or 1 cent per dozen for picking up eggs at the farm and transporting them to the truck terminal. Rates of one trucker from the terminal to various hatchery centers were:

Del-Mar-Va	$ .90 plus tax per case
Georgia	2.00 plus tax per case
Virginia	1.20 plus tax per case
Mississippi	2.50 plus tax per case

Empty cases were delivered to the producers by the pickup truck and the producer paid a delivery charge of 10 cents per case. Some truckers and brokers charge for the case as well as trucking. One large trucker charged 20 cents per case — 10 cents for trucking, and 10 cents for the case — for picking up eggs locally. Another charged only for the trucking as the hatchery was supplying cases without charge.

Losses on Shipments

An Ohio hatchery which purchased eggs from a New Hampshire shipper allowed up to 4 percent breakage without a penalty charge. But many lots were running over 5 percent, and losses were averaging about $1.45 per case after salvage of cracked eggs for market sale. A competitor from the southwest was sending in eggs in which losses were running about 2½ percent. In both cases shipments were made by rail. Figures on losses from sample shipments follow:

No. Lots	No. Cases	Lowest Breakage	Highest Breakage	*Average Breakage
11	110	2.4%	8.3%	4.65%

*Weighted

*Data from *Problems of Transporting and Marketing Hatching Eggs in the Northeastern States*, by E. H. Rinear, Poultry Branch, P.M.A., U.S.D.A.

The New Hampshire producers reduced these losses and met competition by use of new or better cases and more careful packing.

The hatcheryman may absorb shipping losses, but he will eventually seek contacts where losses are low. If deductions were made for broken eggs, certainly more care would be taken in packing. The packer is, of course, not always to blame for rough handling in transit which results in many losses. More careful checking of shipping cases and additional care in packing are desirable.

One hatching-egg producer in New Hampshire shipped 1,760 cases (165 shipments) by rail during the first five months of 1949. These were distributed as follows: Florida — 1,113, Virginia — 534, Georgia — 70, New York — 28, Connecticut — 10, Pennsylvania — 3, and Iowa — 1. Claims were made in only one shipment, involving 13 cases and 180 eggs, which is a very good record. Another shipper of hatching eggs shipped 4,592 cases

(a) Eggs badly damaged

Figure 4. Illustrations of a Valuable Product Carelessly Packed and Handled

(b) Both flat and case damage

(c) Total loss could result here

(d) Notice the split wooden case

by rail in 1947. He made claims in 37 shipments, involving 612 cases and 13,517 eggs. In these two examples, the percentage of cases claimed to be damaged varied greatly and amounted to ¾ of 1 percent for one shipper and over 13 percent for the other. Data made available by railway express officials indicate very great differences in the losses claimed by various shippers. Some shippers who pack their eggs carefully in new or good used cases have held loss claims very low. Shippers who handle eggs as packed by various producers will have variable results and higher losses may be sustained.

Some comments of hatching egg producers and handlers on rail and truck shipments follow:

PRODUCER (A) "High rail rates are forcing hatcheries to buy locally."

PRODUCER (B) "Principal trouble one of packing eggs of poor quality."

PRODUCER (C) "Rail rates too high. Truck door-to-door service reduces expense and breakage."

PRODUCER (D) "Use rail shipments to Virginia and the South; truck shipments to Maryland."

PRODUCER (E) "Have shipped eggs by rail with good results."

PRODUCER (F) "Have shipped eggs to Florida by rail for 20 years in cases with cup flats."

PRODUCER (G) "All eggs go by rail." No special trouble.

It is evident that some shippers have shipped over long periods by rail with small losses. It appears that much of the difficulty in both eggs and chicks occurs at certain transfer points. But much depends upon the care in packing eggs, since considerable variation occurs between producers in shipments to the same points.

The use of wooden egg cases in poor repair, old and worn flats and fillers, and inclusion of blind checks are important reasons for excessive visible egg breakage in transit.

Poor stacking of cases, such as may result from mixed lots of paper and wooden cases, rough handling, and numerous transfers are other factors in additional egg breakage.

One of New Hampshire's largest shippers of hatching eggs, R. C. Durgin, issues a sheet on which common difficulties and methods of correcting them are listed. The items on which the producer needs improvement are checked. This seems to be a quick and satisfactory way of encouraging changes in practices which will improve the condition and quality of hatching eggs. This sheet is reproduced on the next page with his permission.

Care in Packing Eggs

Considerable variation exists in the care with which eggs are packed. Shippers who give special attention to packing eggs have relatively small losses. Some producers use many cases which should have been discarded. One producer, who holds breakage at a very low figure, packs 24 dozen to the case and places double flats, top and bottom, and between each layer. Another who maintains low breakage uses all new paper cases. A railway express agent, who made a practice of adding extra flats on the top layer of eggs where needed, stated that he had had no claims since the practice was placed in effect.

HATCHING EGG CRITICISM

R. C. Durgin Egg Service
Newmarket, N. H.

Flock No. .....

Breed ..... Date .....

Small Eggs	We are unable to ship eggs of this size and it is necessary that these be discarded. Eggs must be graded 23 oz. and up to 28 oz.
Double Yolk Eggs	These will not hatch. Please do not pock them. They are a total loss to any hatchery.
Soft Shell Eggs	These will not hatch. Please do not pack them.
Eggs With Heavy Ridges	These generolly will not hatch and should not be packed.
Wrong Ends Up	Pointed ends should be down as the air cell is normally in the large end of the egg and when the large end is down the air cell rises to the top thus breaking away from the shell. Such eggs seldom hatch.
Dirty Eggs	Too much dirt on eggs should be avoided. Dirt should be removed with a rag or scrapped off with o knife. This excessive dirt is usually caused by insufficient litter in the nests or floor litter excessively wet.
Chilled Eggs	Generally do not hotch. Eggs should be gathered often in cold weather and stored at 45-60 degrees. In colder months cases should be lined with newspapers to avoid exposure while being transported.
Poor Flats-Fillers	Be sure you have good flats on both the bottom and top of each case and also between layers. Broken flats and fillers cause broken eggs. Our drivers will furnish you with replacements.
Cases Poorly Marked	Kindly remove flock numbers and other identification from cases used a second time. Only one flock number should appear and others should be removed. Mark breed also. This is important as you will be required to refund where incorrect breed is identified os most hotcheries have no use for breeds other than ordered.
Excessive Breakage	Broken eggs are a complete loss to anybody. Handle and pack eggs with core. Rough handling breaks cells even where the shell is unbroken. These eggs will not hatch.
Fertility Poor	Often caused by insufficient males, old males, or moles with frozen combs. Too thin breeds often produce many infertile eggs. Eggs held over ten days before being set are often cleor. Please check these points at once.
Hatchability Poor	Sometimes caused by poor feed. Please feed a breeder mash. We recommend the feeding of semi-solid buttermilk. Additional green feed is also helpful.
Chick Quality Poor	We suggest you feed a good well-balonced breeder mash. Inferior feed can produce inferior chicks. Keep your birds in good flesh, active and healthy. Try to maintain the best of sanitation.
Remarks	

With hatching eggs at 8 cents each, a saving of 2 percent in eggs shipped would mean a saving of about 58 cents a case. Actually some of these cracked eggs would have some market value, but there are other loss factors involved, namely: (a) Transportation charges on eggs which will not hatch, and (b) Loss of good will which is inevitable when a hatchery must pay either transportation or for the eggs which do not hatch.

Experimental Shipments

Arrangements* were made with two New Hampshire producers, a trucker, and a Maryland hatchery for checking and candling eggs at the farm, at the truck terminal, and at the Maryland hatchery. Similar arrangements were also made on air shipments with New Hampshire producers and a Florida hatchery.

New cases carried eggs with less average breakage than those that had been used. It is difficult to describe the exact condition of a used case or to make accurate comparisons between used and new cases. In one shipment to Florida the breakage was nearly 50 percent higher in used cases than in new. The important factor is not whether they are new but whether they are really sound. There is a tendency to use old cases a little too long. Paper cases have been known to make 40 or more trips, but this is the exception. One shipper replaces about 10 percent of his cases with new ones on each shipment.

By Air

A shipment of 18 cases of hatching eggs was made to Jacksonville, Florida, from Concord, N. H., by air in June, 1948. Seven cases were candled at both points and only ½ to 1 percent were cracked or broken. The breakage by rail at the same time was 2¾ percent. Time by air is about 18-20 hours against three to four days by rail. But the difference in breakage would not pay for the higher charges. Sufficient data on comparative hatchability were not available to evaluate this factor.

By Rail

Forty cases of hatching eggs were shipped by rail to Florida in May, 1948. Eight cases were candled before and after shipment. The average breakage was 4.8 percent. The breakage in the different types of cases used was:

New fiber	7 eggs per case (1.9%)
Used fiber	10 eggs per case (2.8%)
Heavy wooden	27 eggs per case (7.5%)

One lot of new fiber cases went through with less than 1 percent breakage.

By Truck

Twenty lots of hatching eggs in eight shipments, during a seven months' (April to December) period, were sent from New Hampshire to a Maryland hatchery.

These eggs were candled at the farm, at the shipping terminal, and at the Maryland hatchery. Breakage averaged as follows: at farm, six eggs per case; farm to shipping terminals under one egg per case; shipping terminal to hatchery, almost eight eggs per case.

Breakage Tests

Shipments were made of eggs from two producers from New Hampshire to Maryland on the same truck. An average of 6.5 eggs per case were

*The Poultry Branch, P.M.A., U.S.D.A., made inspections and obtained data at the Maryland hatchery (also Florida) and cooperated in checking, candling, and obtaining data on the New Hampshire end. The New Hampshire Department of Agriculture assisted in grading and candling in New Hampshire.

found to be broken or cracked at the farm in one instance, and 5.3 eggs per case in the other instance.

Breakage of eggs in different positions in the case was determined for 52 cases in four shipments to Maryland. (See Table 10.)

Figure 5. Loading Hatching Eggs for Shipment by Plane

Figure 6. Time and effort may be saved in loading eggs in a trailer truck by the use of a loading device. The cases are placed on the roller in the warehouse (above), rolled into the truck (right), and then placed in position for shipment (below).

Table 9. Egg Breakage in Eight Shipments to Maryland

Month Shipped	Found Cracked and Broken When Ready for Shipment At Farm		Cracked and Broken in Shipment Terminal To Maryland	
	Producer 1 Percent	Producer 2 Percent	Producer 1 Percent	Producer 2 Percent
April	1.6	1.7	1.8	1.0
May	1.6	1.6	6.9	5.4
June	2.3	.8	.7	.4
July			5.4	5.7
August	2.3	2.3	.5	.4
November	2.0	1.0	.7	.6
December (1st shipment)	1.0	1.4	1.2	1.0
December (2nd shipment)	1.3	1.0	.1	.6
Wt. Average	1.8	1.4	2.2	2.1

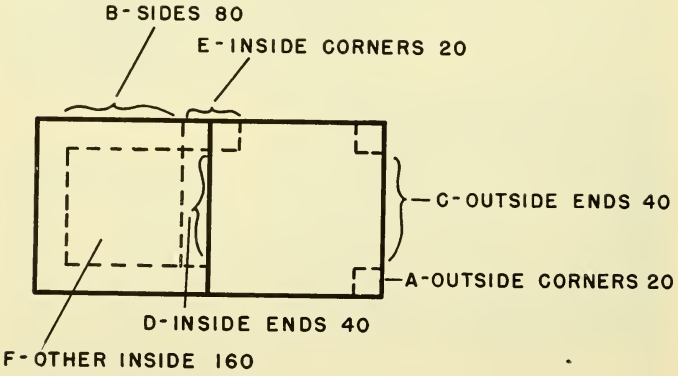
Table 10. Breakage of Eggs in Different Positions in the Cases

Based on 52 cases as received at a Maryland hatchery from New Hampshire

	In Named Position Eggs Per Case Number*	Cracked or Broken Percentage
A. Outside corners	20	9.6
B. Sides	80	4.7
C. Outside end	40	4.4
D. Inside ends	40	4.9
E. Inside corners	20	10.1
F. Other inside	160	5.9
A. B. C. D. Outside positions	160	5.9
D. F. Inside positions	200	4.3
A. E. Inside-outside corners	40	9.9
All positions	360	5.0

*Figures are totals for one case.

Breakage in the corners is about double the average breakage. Special attention should be given the condition of the corners of flats and fillers, for weakness here will result in heavier breakage.



Data: U.S.D.A.

Figure 7. Diagram Showing Location of Eggs in the Case in which Breakage data were Obtained

Egg breakage was also checked in five shipments of 65 cases to Maryland. Results are shown in Table 11.

Table 11. Total Egg Breakage in 65 cases in 5 Test Shipments from New Hampshire to Maryland

Layers (top to bottom)	1	2	3	4	5
% of the time largest breakage occurred	32.3	16.9	20.0	15.4	15.4
Average number eggs found broken per layer	4.8	3.7	4.4	3.4	4.2

Heaviest breakage occurs in the top layer of the case. Some shippers give extra protection here. Oversize cases should be used where eggs run large and special attention should be given the tops of the cases.

Hatchability Tests

Hatchability reports were obtained on all test shipments at the Maryland hatcheries' end and in part at New Hampshire production and shipping points. The results were quite variable and no conclusive data were obtained on comparative hatchability at shipping and receiving points. (See Table 12.) Producer A had good hatchability while B is below average. It appears that more accurate data on the influence of handling and transporting hatching eggs can be obtained by shipping them out and returning them and hatching all lots in the same incubators.

These data are shown in Table 12 and in Table 13.

Table 12. Hatchings of Eggs from Eight Shipments to Maryland in 1948

Producer No.	No. Eggs Hatched	Chicks Hatched	Clear or Unfertile Eggs	Eggs Broken In Tray	Chicks Dead In Shell
A	20,170	83.6	7.5	.5	8.4
B	10,031	67.2	23.4	.3	9.1
Both	30,201	78.2	12.8	.4	8.6

Table 13. Hatchability and Percentage of Salable Chicks in Hatching of Eggs in Test Shipments

Points Where Eggs Were Hatched		Hatchability		Chicks Which Were Salable	
		Producer A Percent	Producer B Percent	Producer A Percent	Producer B Percent
1	N. H.				
	Md.	87	67.4	99.	98.2
2	N. H.	87.3	60.		
	Md.	84.4	56.4	98.8	97.7
3	N. H.	80.5	61.		
	Md.	81.1	69.7	98.7	99.4
4	N. H.				
	Md.	80.		98.2	
5	N. H.	79.7	76.3	100.	97.4
	Md.	84.1	71.1	98.8	98.
6	N. H.	84.	69.7	94.4	95.3
	Md.	87.6	75.8	99.	95.6
7	N. H.	87.3	68.2	94.4	95.3
	Md.	84.9	67.8	98.5	95.6
8	N. H.	80.3	67.3	97.4	95.
	Md.	85.5	63.7	99.6	95.6
All	N. H.	*	*	*	*
	Md.	83.6	67.2	98.8	97.2
Average Md.		78.2		98.3	

*Incomplete.

Recommendations

1. Because of the importance of hatching eggs for broiler purposes, consideration might be given to feeding and dressing trials on various strains to obtain comparative facts on rapidity and economy of gains, conformation, and dressing and grading percentages. Such facts may serve as a guide in developing the industry.

2. More careful inspection and repair of shipping cases is advised to reduce breakage of eggs in transit.

3. Since egg breakage in the corners of the cases is much higher than in other locations, special notice should be taken of the condition of the corners of flats and fillers.

4. Since about 40 percent of the breakage from farm to hatchery occurs at the farm, greater care in checking and packing for shipment seems desirable.

5. Since the heaviest breakage in any layer occurs in the top layer in the case, special attention should be given in checking tops of cases, and in furnishing extra flats or pads to top the layers.

6. Oversize cases are recommended for the larger sizes of hatching eggs to permit additional space and extra protective pads or flats.

7. Shippers should give constructive criticism on shipments for each of their producers.

8. While high hatchability is probably rewarded in one way or another, consideration to methods of giving it specific recognition (as some are doing) seems advisable.

9. Hatching egg producers should give consideration to producing strains of birds in strong demand or with such potentialities. There may be no best strain, but there are some which are in much greater demand and bring higher premiums than others. Base decisions on facts plus careful judgment.

Summary

1. The poultry industry is New Hampshire's largest agricultural enterprise, in terms of gross return, accounting for 44 percent of all gross agricultural income in 1949.

2. The New Hampshire breed has gained rapidly in popularity and now leads all breeds in National Poultry Improvement Plan flocks.

3. An aggressive program in disease eradication has materially aided New Hampshire's hatching egg sales. The percent of infected birds (pullorum) reached a low of .002 of 1 percent in 1950-51.

4. New Hampshire's reported chick hatchings in relation to total eggs produced is the largest for any New England State.

5. Barred crosses account for over half the hatching eggs and New Hampshires make up about 40 percent of the total.

6. New Hampshire hatcheries reported about 31 percent of the chicks going to New England, 36 percent to Middle Atlantic states and 21 percent to Southern states.

7. Almost three-quarters of the hatching eggs went for broiler purposes, one-quarter for layers.

8. Hatching eggs made up about two-thirds of all egg sales of hatching egg producers.

9. The percent of all eggs going for hatching eggs varied from about 68 percent in spring to low of 63 percent in summer.

10. Premiums for hatching eggs varied among producers from an average of about ten to 60 cents per dozen in 1947. Average for all producers was about 27 cents per dozen.

11. Of all hatching eggs shipped, about 10 percent go to New England, 52 percent to Middle Atlantic states, and 31 percent to Southern states.

12. About 41 percent of all hatching eggs are shipped direct to the hatcheries.

13. Fiber cases make up almost half of the total shipped, commercial wooden cases 31 percent, and heavy returnable cases 21 percent.

14. Careful checking and repair of egg cases is important.
   (a) One shipper replaced 10 percent of his paper cases each trip.
   (b) Another shipper repairs almost a third of his returnable wooden cases each trip.

15. The cost of shipping hatching eggs by plane is still too high to encourage many shippers and savings in breakage do not offset the extra cost.

16. Air freight rates to some Florida points are more than double rail rates, while air express rates are over six times rail express.

17. The bulk of the hatching eggs moving to the Eastern Shore or Del-Mar-Va area go by truck.

18. In shipments to a Maryland hatchery, about six eggs per case were found cracked or broken at the farm, less than one egg per case from farm to terminal, and about eight eggs per case were broken from terminal to hatchery.

19. Shippers vary greatly in claims for losses by rail. One large New Hampshire shipper made claims in 13 percent of cases shipped and another less than 1 percent.

20. Egg breakage in the corners of the cases were double the average breakage.

21. Eggs in the top layer had the heaviest breakage; those in the 4th layer, the least breakage.

22. Methods of reducing egg breakage in shipments may include:
   (a) handling and careful checking of eggs before packing.
   (b) elimination of oversize and thin shelled eggs.
   (c) extra size or built-up cases for oversize eggs.
   (d) extra flats top and bottom and between layers.
   (e) careful checking of all cases used: making repairs where practicable, and elimination of those that would not carry eggs safely.

23. Premiums for high hatchability reward the careful and competent producer.

24. Several large hatcheries do pay for hatching eggs on the basis of hatchability, but many dislike the extra bookkeeping involved.